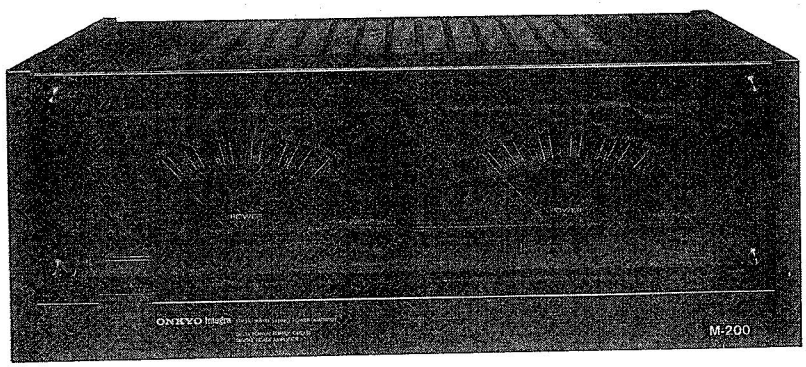
ONKYO® SERVICE MANUAL

Super Servo Stereo
Power Amplifier
MODEL M-200



SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY MARK ⚠ ON THE SCHEMATIC DIAGRAM AND IN THE PARTS LIST ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE THESE COMPONENTS WITH ONKYO PARTS WHOSE PARTS NUMBERS APPEAR AS SHOWN IN THIS MANUAL.

MAKE LEAKAGE-CURRENT OR RESISTANCE MEASUREMENTS TO DETERMINE THAT EXPOSED PARTS ARE ACCEPTABLY INSULATED FROM THE SUPPLY CIRCUIT BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.

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ONKYO®
AUDIO COMPONENTS

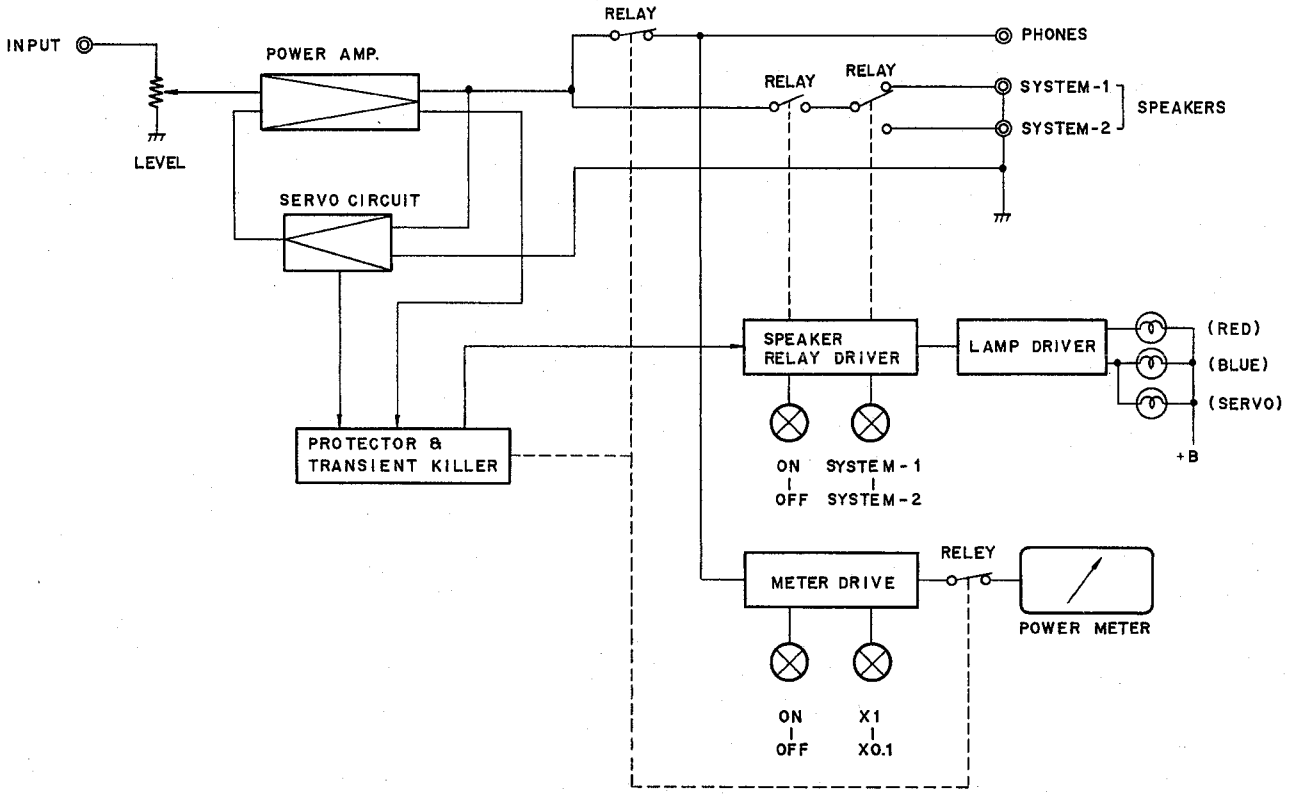
SPECIFICATIONS

Power output:	210 watts per channel, min. RMS, at 8 ohms, both channels driven, from 20 Hz to 20 kHz, with no more than 0.005% total harmonic distortion 220 watts per channel, into 8 ohms at 1 kHz, 0.005% THD
Total harmonic distortion:	0.005% at rated power 0.005% at 1 watt output
Intermodulation distortion:	0.005% at rated power
Frequency response:	+0, −1.5 dB at 1Hz−100kHz
Input sensitivity:	1.5V
Input impedance:	47 kohms
Damping factor:	200 (8 ohms, 1 kHz)
S/N ratio:	126 dB (IHFA, Shorted)

Outputs:	SPEAKERS 1 & 2,
Inputs:	INPUT
Power supply:	AC 220V, 50 Hz
Semiconductors:	4 FETs, 82 transistors, 89 diodes, 7 ICs
Dimensions:	480(W) x 191(H) x 439(D)mm 18 57/64" x 7 33/64 " x 17 9/32"
Weight:	31 kg, (68.3 lbs.)

Specifications and features are subject to change without notice.

BLOCK DIAGRAM



PRECAUTIONS

1. Replacing the fuses

For continued protection against risk fire, replace only with same type and same rating fuse.

CIRCUIT NO.	PARTS NO.	DESCRIPTION
F601, F602	252077	4A-SE-EAK, Primary fuse

2. Replacing the lamp

This unit uses the lamp listed below.

CIRCUIT NO.	PARTS NO.	DESCRIPTION
PL801, PL802	210092	PL14V 150mA
PL901, PL902		
PL803, PL804	210089	PL14V 150mA
PL903, PL904		
PL701	210092	PL14V 150mA
PL702 ~ PL706	210094	PL14V 60mA–3.0

ADJUSTMENT PROCEDURES

■ **PREPARATIONS**

1) Place the unit on a level surface, right side up, leaving at least 15mm of space at the ventilation openings.
2) There should be no load or signal and the level should be at minimum.
3) The air should be calm, as moving air can upset the stability of the gauges.

1. Meter Zero Point Adjustment

With the power off, align each needle with the "0" mark using the adjustment screw underneath each meter.

Caution: Do not perform this adjustment immediately after turning the power off. Perform after the meter circuit section has discharged.

2. Idling Current Adjustment

Remove the top cover and, five minutes after the power has been turned on, adjust the semi-fixed resistor R126 (R226) so that the voltage between Vct-Iid on printed circuit board NADA-983a is 13mV.

3. Meter Offset Adjustment

About five minutes after turning power on and with no signal present, adjust the semi-fixed resistor R639(R640) on the pc board NAME-2343 to align each meter needle with "0"

4. Meter Level Adjustment

Apply a 1kHz signal to the left channel input terminal and set the M-200 meter range selector to x0.1. Adjust the input so that the speaker output terminal voltage (no load) is 12.65V (22.0 dBV). Then adjust the semi-fixed resistor R611 of pc board NAMA-2343 so that the meter needle is aligned with 0 dB. Adjust the right channel in the same manner with the R612. (Do not feed a signal to both the left and right channels at the same time.)

CIRCUIT DESCRIPTION

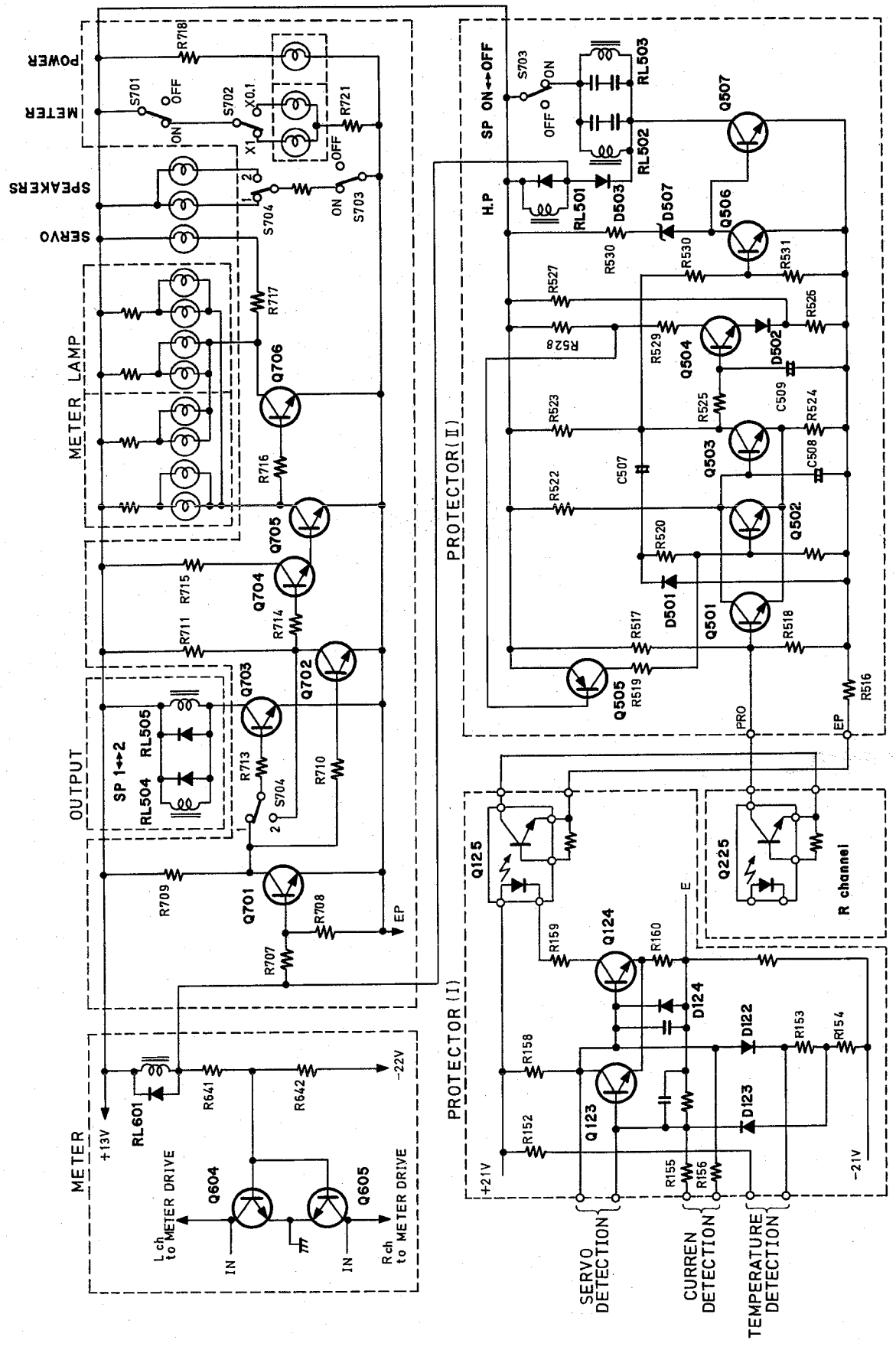
In the dual Super Servo system, servo feedback loops are used in both the positive and negative sides of the amplifier to cancel out distortion generated within the amplifier itself. This double feedback configuration is particularly effective in power amps. where very large currents are handled, because it suppresses the generation of undesirable voltages created by the amp's internal wiring and differences in impedances between the various sections of the power amp. The benefits are an improvement in sonic clarity and an enhanced feeling of realism.
The dual servo feedback system used in this unit, along with the precision circuitry and high performance circuit components, means that the stability of this power supply is equivalent to a 100 times larger ordinary power supply.

Outline

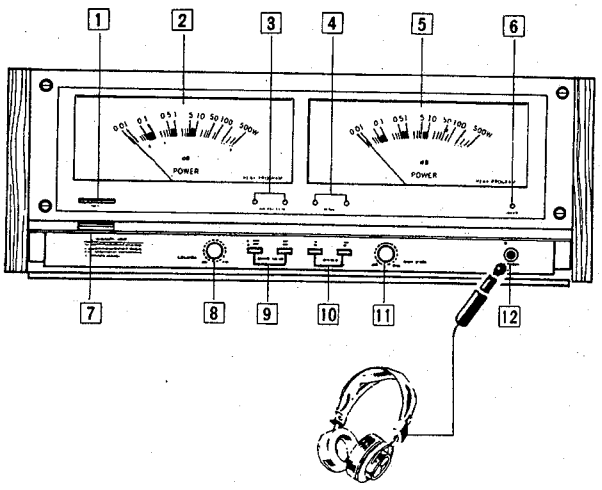
1. The first stage consists of a directly coupled cascode bootstrap dual FET differential amplifier. Next is an emitter follower buffer and a cascode current mirror push-pull class A pre-driver. The output stage is a 3-stage Darlington triple push-pull pure complementary system. Here servo feedback loops are added to both the positive and negative terminals on the output side to prevent the slight differences in impedances between circuits from generating undesirable voltages. This is a high power amplifier having a rated output power of 200W + 200W.
2. The dual super servo system functions to remove ultra-low frequency signal components created by gradual fluctuations in temperature, power supply voltage and other factors. Another reason for using this system is that it makes possible the elimination of all capacitors, a source of degradation of sound quality, from the signal path (the positive side of the amp) On the negative (ground) side, changes in the power supply cause corresponding movement in the speaker diaphragms since the speakers are directly connected to the power supply on the negative side. In ordinary amplifiers, this problem is dealt with by simply using heavier ground cables. Unfortunately, this method is not sufficiently effective in power amps because of the large currents that exist. The second servo loop in the ground line solves this problem by reducing the effect of fluctuations in the power supply to 1/100 th of the normal level.
3. The output transistors of most amplifiers use either the class B or AB push-pull system. Class A push-pull is used only rarely. In class B and AB, non-linearities are easily generated at points where the push-pull (positive and negative) waveforms are connected. This is the cause of switching distortion, a problem that can noticeably affect the clarity of sound reproduction. Switching distortion does not occur in class A amps, but this system does require very high currents because the operating point must be moved to the center. These high currents generate large amounts of heat, meaning that the efficiency of the power supply is extremely low.
   To deal with switching distortion, this unit employs a linear switching system which uses a special bias current to correct the points where the upper and lower waves are connected. The result is very linear operating characteristics. Linear switching and the use of high ft power transistors yield amplification characteristics that are exactly the same as those of class A operation.
4. Highly accurate power meters that display the output levels at each instant are used. These meters have large drive sections to provide high speed response to output level changes. The logarithmic compression circuit, located on a monolithic IC, and meter temperature compensation circuit further improve the accuracy of the meter indications. The meter scales are very large to make them easy to read.
5. Ordinary iron is used in many of the structural parts. However, iron would cause harmonic distortion if it were used inside the chassis where magnetic flux exists. In this unit, all main components use non-ferrous metals to prevent the generation of harmonics, Thereby assuring higher waveform transmission fidelity.

Circuit Description – Protection Circuitry

If, for some reason, a DC voltage is generated in the amp's output circuitry, an abnormal voltage will also be generated in the output terminal of the servo IC. If an abnormal current appears at power transistors, it is detected at Q307 and Q308 and at Q123 and Q124 of the protective circuitry detection section and the photo coupler Q125 is switched off. If the temperature at the power circuit rises to an abnormally high level, it is detected by the posistor R327 which causes the photo coupler Q125 to be switched off. When the L or R channel photo coupler is switched off, Q501 is switched on and Q507 is switched off to cut speaker relays RL502 and RL503 so that no output signal can go to the speakers. If the abnormal situation continues, the time constants of R525 and C509 cause Q504 and Q505 to switch on so that Q502 is also switched on. Since this loop is held, the protection circuitry will continue to function until power is switched off by the power switch.


POWER
METER
SPEAKERS
SERVO
METER LAMP
OUTPUT
METER
PROTECTOR(I)
PROTECTOR(II)
SP 1↔2
SP ON↔OFF
H.P
R channel
SERVO DETECTION
CURREN DETECTION
TEMPERATURE DETECTION
Lch to METER DRIVE
Rch to METER DRIVE
+13V
-22V
+21V
-21V
EP
PRO
E
IN

FRONT PANEL FACILITIES



1. Power indicator
2. Left channel power meter
3. Meter range indicators
4. Speaker output indicators
5. Right channel power meter
6. Servo operation indicator
7. Power switch
8. Left channel level control
9. Meter range selector switches
10. Speaker output selector switches
11. Right channel level control
12. Headphone jack

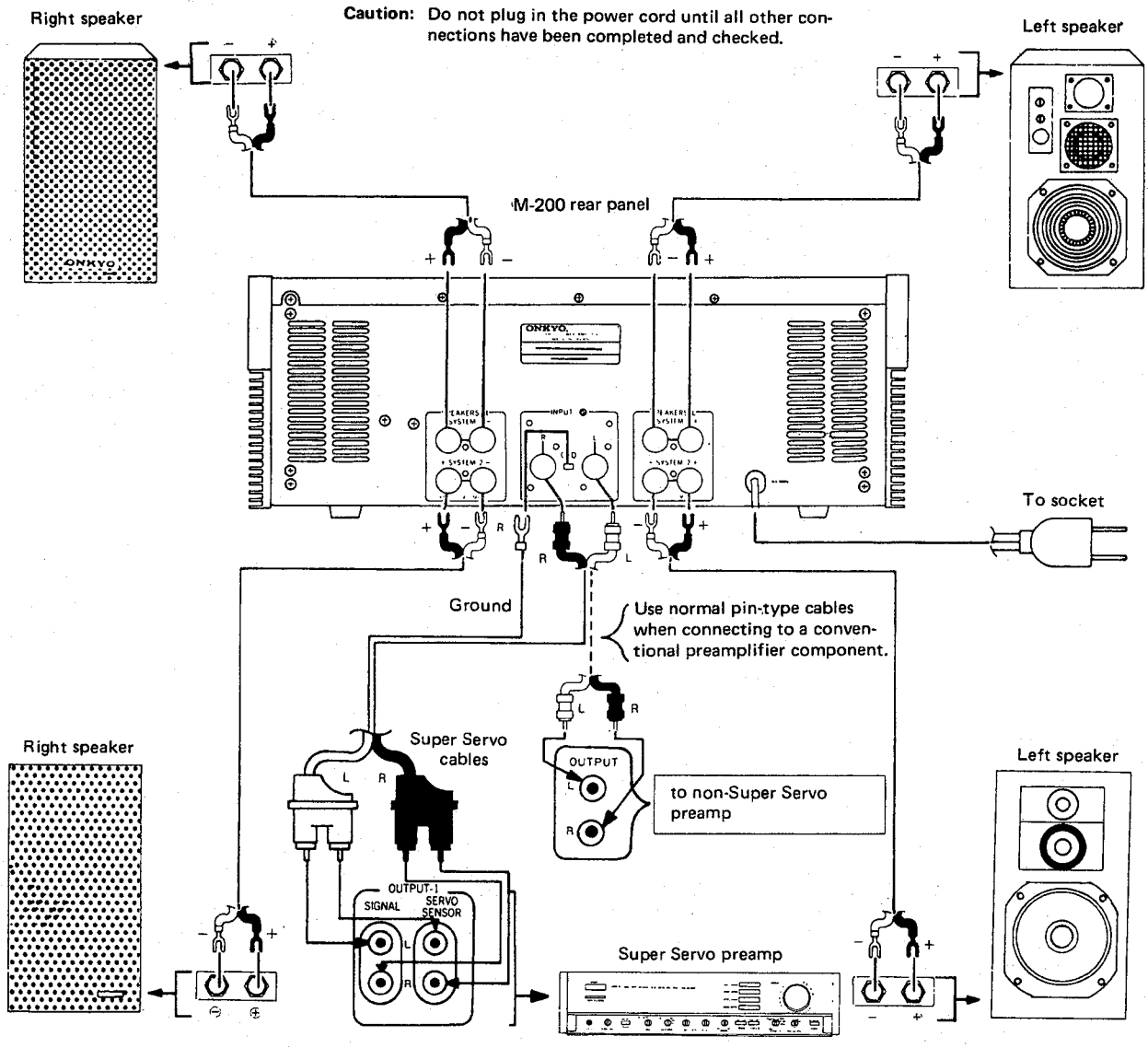
Before turning power on for the first time, turn the level controls [8] [11] all the way to the right, turn the volume control on the pre-amp to its minimum setting and confirm that both power meter needles are pointing at '0'.
When the power switch is turned on, both meters will be illuminated by a soft red light. After a short time, the illumination will change to normal and the SERVO OPERATION indicator [6] will light up.
Begin operation of the desired audio source and slowly raise the pre-amp volume control to the desired listening level.
Note that no sound will be produced until the SERVO OPERATION indicator [6] illuminates because the transient killer is operating during this time,

Using the Meter Range Selector Switches
Use these switches to turn the power meters on and off and to select the sensitivity. When the left selector is ON (▬) and the right selector is in the x0.1 (▬) position, the meter sensitivity is increased by 10 times. For example, if the meters show 100 watts of output, the actual output power at that time is 10 watts. When the right selector is in the x1 (▬) position, the meters show the actual output power. The meter range indicators [3] light to clearly show which mode has been selected. You should use the setting in which the needles do not move beyond the end of the scales. If the right selector is OFF (▬), the meter needles will not move at all.

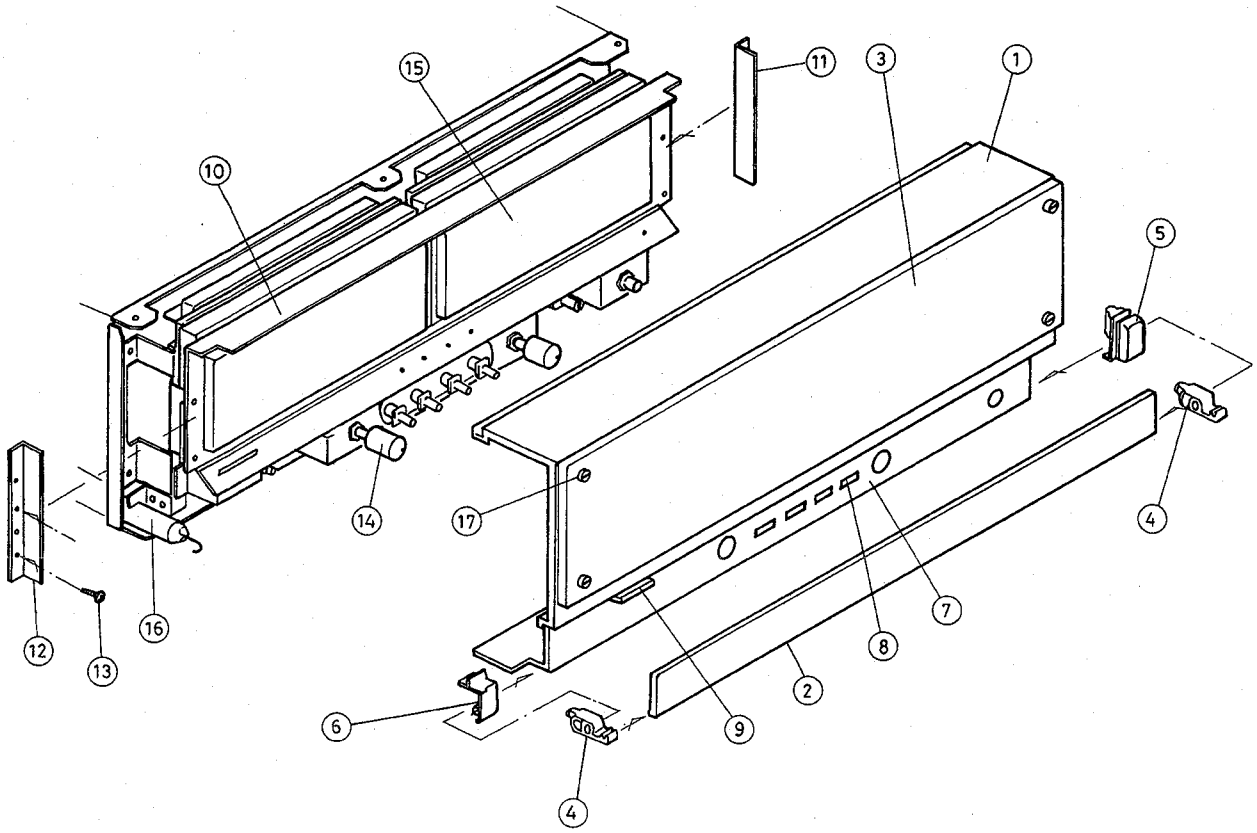
Using the Level Controls
This unit is equipped with separate left and right channel output level controls. Normally, both controls should be turned all the way to the right (MAX.). If one speaker is much louder than the other due to your listening position or the speaker placement, adjust the level controls [8] [11] to obtain the proper balance between the speakers.

Using the Speaker Output Selector Switches
Depress the left selector to the OFF (▬) position to shut off the output to all speakers. Depress the right selector to use only the speaker system connected to the SYSTEM 1 terminals on the rear panel of the M-200.
When the right selector is in the IN (▬) position, only the SYSTEM 2 speakers are heard. The speaker output indicators light to show which system is being used.

SYSTEM CONNECTIONS

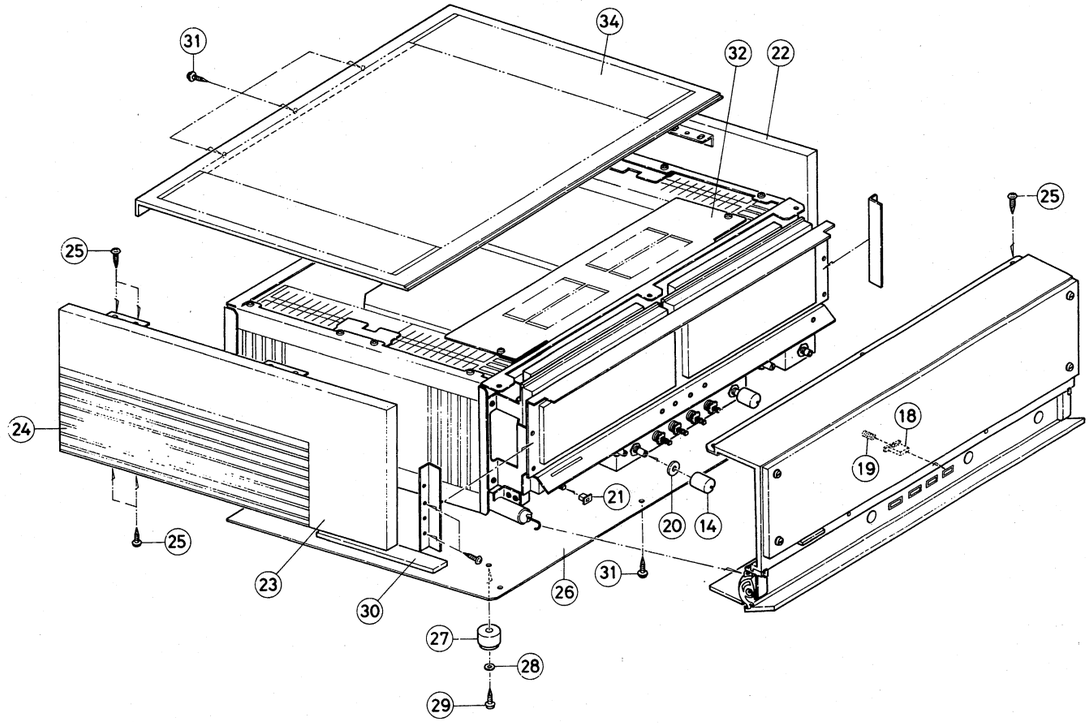


EXPLODED VIEW PARTS LIST



REF. NO.	PARTS NO.	DESCRIPTION
1	17874121	Front panel ass'y
	(Include 2, 4 to 7 and 9)	
2	27210588	Front panel S
2	28135104	Model plate
3	28191067	Clear plate
4	27300400A	Bearing L
5	28125083	End cap R
6	28125082	End cap L
7	27267083	Guide, push
8	28320479	Knob, push
9	27267084	Guide, power
9	28320480A	Knob, power
9	27180033	Spring B

REF. NO.	PARTS NO.	DESCRIPTION
10	27120715	Back panel ass'y
11	27190092A	Holder
14	28320481	Knob, level
15	243134	Output meter
16	24610440	Damper ass'y
17	27300348	Special screw
	27270017A	Spacer
	863140	N-4F-N, Nut
	870052	Washer
	870054A	Wahser



REF. NO.	PARTS NO.	DESCRIPTION
18	28320479	Knob, push
19	27180049	Spring G
20	28140219	Cushion
21	27190091	Holder, push
22	28185124-1	Side panel R ass'y
23	28185123-1	Side panel L ass'y
24	27300345A	Plate, radiator
25	834430068	3TTS+6BQ(BC), Tapping screw

REF. NO.	PARTS NO.	DESCRIPTION
26	27170092	Bottom board
27	27175020	Leg
28	87613008	W3 x 8F, Washer
29	834130208	3STS+20BQ, Tapping screw
30	28140323	Cushion
31	831430088	3TTW+8BQ(BC), Tapping screw
32	28184102	Cover F
34	28184098	Cover

PARTS LIST

SYMBOL NO.	PARTS NO.	DESCRIPTION	REF. NO.
A1	27110119	Front bracket	
A2	27140436	Bracket, power	
A3	27140435	Bracket, volume	
A4	27140437	Bracket, headphone	
A5	27140438	Bracket, lamp A	
A6	27140439	Bracket, lamp B	
A7	27190009	Holder	
A8	27300396	Insulating plate B	
A13	27110120	Front Bracket B	
A18	27100035B	Chassis	
A19	27130146	Bracket, power transformer	
A20	27130232A	Bracket, pc board	
A22	27140257	Bracket, pc board	
A23	27270030	Spacer	
A24	27300358	Bus	
A25	27300395	Insulating plate A	
A37	27190029	Holder	
A41	27260061	Shaft D	
A42	27160080	Radiator	
A43	27130144A	Bracket	
A44	27130231A	Bracket C	
A45	27140440	Bracket HE	
A46	27140376B	Holding bracket, transistor	
A52	27260043	Shaft ass'y	
A62	27120716	Back panel	10
A63	270280	SR-4K-4, Strainrelief	
A70	27300380	Damper ass'y	
A76	27260042	Shaft A	
A77	27140462	Bracket DA	
A79	27140487	Bracket, door	
A350	17870121	Front panel ass'y	1
(A351)	27210588	Front panel S ass'y	2
(A352)	28135105	Model plate	2
(A353)	28191067	Clear plate	3
(A354)	27300400A	Bearing	4
A355	28125082	End cap, Left	6
A356	28125083	End cap, Right	5
(A357)	28140314	2 x 5 x 7, Cushion	
A358	28140296	0.5 x 30 x 7, Cushion	
(A359)	28140324	1.5 x 20 x 10, Cushion	
(A360)	27267084	Guide, power	9
(A361)	27267083	Guide, push	7
(A362)	27180033	Spring B	9
(A363)	27180049	Spring G	8, 19
A364	28140318	3 x 150 x 10, Cushion	
A365	27300399A	Bearing R	
A366	28133036A	Back plate	
A367	27190092A	Holder	11
A372	27300348A	Special screw	17
A374	863140	N-4F-N, Nutt	
A375	870052	Washer	
A376	870054A	Washer	
A377	28140024	Cushion	
A378	27190091	Holder, push	21
A384	28184102	Cover F	32
A385	28184098A	Cover	34
A386	28140020	4 x 10 x 40, Cushion	
A388	28140260	Cushion	
A395	28185235A	Side panel ass'y, (Left)	23
(A395a)	28185236A	Side panel	
(A395b)	27300345A	Radiator	24
(A395c)	27140434A	Bracket	
(A395d)	27140441A	Bracket (U)	
(A395e)	27140442B	Bracket (D)	
(A395f)	85143113	M3.1+13F(BC), Wood screw	
(A395g)	82143006	3P+6FN(BC), Pan head screw	

SYMBOL NO.	PARTS NO.	DESCRIPTION	REF. NO.
(A395h)	28140327	1.5 x 7 x 104, Cushion	
(A395i)	28140020	4 x 40 x 10, Cushion	
A400	28185237A	Side panel ass'y, Right	22
(A400a)	28185238A	Side panel	
A601	27170092	Bottom board	26
A602	27175020	Leg	27
A603	28140323	3 x 150 x 20, Cushion	30
A604	834130208	3STS+20BQ, Tapping screw	29
A605	831430088	3TTW+8B(BC), Tapping screw	31
A606	87613008	W3 x 8f, Washer	28
A801	28320480B	Knob, power	9
A802	28320481	Knob, level	14
A803	28320479	Knob, push	8, 18
A804	893030	E-3, Circlip	
A805	28140219	Cushion	20
Q301 ~ Q303	2201223 or	2SC2773(0) or	
Q401 ~ Q403	2201224	2SC2773(Y), Transistor	
Q304 ~ Q306	2201233 or	2SA1169(0) or	
Q404 ~ Q406	2201234	2SA1196(Y), Transistor	
Q309, Q409	2211255	2SC1815(GR), Transistor	
D1 ~ D4	223841	GP-30G, Silicon diode	
L503, L504	230904	B-20L-44, Core	
C1 ⚠	3500065A	0.01μF, AC400V/125V Capacitor IS	
C2 ~ C5	3504151	30,000μF, 90V, Capacitor, elect.	
C6, C7	3800003	Capacitor DTG	
C8 ⚠	3500065A	0.01μF, AC400V/125V, Capacitor IS	
C8a	27300601	SB-1925, Cover, Capacitor	
C11 ~ C14	278131027	1000 pF, 100V, Capacitor, DEW	
R1, R2	5104112	N27D100KB25M, Output level variable resistor	
R327, R427	4000045	PTHBB471TS, Posistor	
F601, F602 ⚠	252077	4A-SE-EAK, Fuse	
M1, M2	243134	NIND-2000S134, Meter	15
P1, P2	25045054	NPJ-1PRBL28, Input terminal	
P3	25045062	M1654A, Stereo headphone jack	
P4 ⚠	253092	AS-CEE-2, Power supply cable	
P6	27300168	Speaker terminal	
P7, P8	25060039	NTM-4PDMN10, Terminal	
P9 ⚠	25108005	Terminal	
S1 ⚠	25035289	NPS-111-L255P, Power switch	
T1, T2 ⚠	230636	NPT-722GS, Power transformer	
	2000166	NSAS-3P062, Socket	
	2000162	NSAS-16P045, Sockt	
	2000163	NSAS-10P046, Socket	
	223018	AC316A, Accessary, Transistor	
U1	17874583A	NADA-983a, Driver amplifier pc board ass'y	

SYMBOL NO.	PARTS NO.	DESCRIPTION	REF. NO.
U2	12731584	NAMP-984, Power amplifier pc board ass'y	
U3	17874585A	NAPC-985a, Protector circuit pc board ass'y	
U4	17874543	NAME-2343, Peak meter driver pc board ass'y	
U5	12731587A	NAPL-987A, Meter indicator lamp pc board ass'y	
U6	12731587B	NAPL-987B, Meter indicator lamp pc board ass'y	
U7	12731582	NASW-982, Switch pc board ass'y	
U8	12731508	NAPL-1008, Power indicator lamp pc board ass'y	

NOTE: THE COMPONENTS INDENTIFIED BY MARK ⚠ ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE ONLY WITH PARTS NUMBER SPECIFIED.

PRINTED CIRCUIT BOARD PARTS LIST

SWITCH PC BOARD (NASW-982)

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	Transistors	
Q701, Q702	2211255	2SC1815 (GR)
Q703	2211884	2SC2655 (Y) or
	2211883	2SC2655 (O)
Q704	2211255	2SC1815 (GR)
Q705, Q706	2201286	2SC882 (P) or
	2201285	2SD882 (Q)
	Lamps	
PL702 ~ PL706	210094	PL14V60mAW-3.0
	Resistors	
R709, R711	441525614	560 Ω, 1/2W, Metal oxide film
R712, R717	441526204	62 Ω, 1/2W, Metal oxide film
R715, R716	441525614	560 Ω, 1/2W, Metal oxide film
R718	441520564	5.6 Ω, 1/2W, Metal oxide film
R719, R720	4000028	D33A, Thermistor
R721	441526204	62 Ω, 1/2W, Metal oxide film
	Switch	
S701 ~ S704	25035228	NPS-222-242-L192
	Sockets	
	2000158	NSAS-3P041, 3P
	2000159	NSAS-5P042, 5P
	2000160	NSAS-4P043, 4P
	2000161	NSAS-8P044, 8P

DRIVER AMPLIFIER PC BOARD (NADA-983a)

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	Transistors	
Q01	2211916 or	2SK240 (BL) or
	2211917	2SK240 (V), F.E.T.
Q02 ~ Q04	2211732 or	2SC1845 (F) or
	2211733	2SC1845 (E)
Q05 ~ Q07	2211792 or	2SA992 (F) or
	2211793	2SA992 (E)
Q08	2211140	2SA798 (0-001)
Q09, Q10	2212041,	2SA916 (K),
	2212042 or	2SA916 (L) or
	2212043	2SA916 (M)
Q11	2211255	2SC1815 (GR)
Q12, Q14	2212031,	2SC1941 (K),
	2212032 or	2SC1941 (L) or
	2212033	2SC1941 (M)
Q13	2211445 or	2SC2291 (F) or
	2211446	2SC2291 (O)
Q15	2212041,	2SA916 (K),
	2212042 or	2SA916 (L) or
	2212043	2SA916 (M)
Q16	2200863 or	2SC2238 (O) or
	2200864	2SC2238 (Y)
Q17	2200873 or	2SA968 (O) or
	2200874	2SA968 (Y)
Q18	2211792 or	2SA992 (F) or
	2211793	2SA992 (E)
Q19	2211732 or	2SC1845 (F) or
	2211733	2SC1845 (E)
Q20	2200394	2SC1625 (Y)
Q21	2200404	2SA815 (Y)
Q23, Q24	2211255	2SC1815 (GR)
	IC	
Q22	222502	NJM4558DX
	Photo diode/transistor	
Q25	226007	TLP531
	Diodes	
D01, D02	223145	1S2076TD
D03 ~ D06	4000068	VD1222
D07	223145	1S2076TD
D08, D09	4000068	VD1222
D10, D11	2239771	RD24E-B1
D12 ~ D19	223145T	1S2076TD
D20, D21	2239633	RD12E-B3
D22 ~ D24	223145T	1S2076TD
	Capacitors	
C01	372122214	220 pF ± 5%, 50V, ST
C03	379121035P	0.01 μF, 50V, DEW
C06, C15	352741009	10 μF, 16V, Elect.
C16	379224737	0.047 μF, 50V, DEW
C19	379221037	0.01 μF, 50V, DEW
C20	379144735	0.047 μF, 200V, DEW
C30, C31	352752209	22 μF, 25V, Elect.
C32, C33	352751009	10 μF, 25V, Elect.
C34, C35	352751019	100 μF, 25V, Elect.
C39	379144725	4700 pF, 200V, DEW
	Resistors	
R01	441621024	1 kΩ, 1W, Metal oxide film
R02	441621044	100kΩ, 1W, Metal oxide film
R03	441626824F	6.8kΩ, 1W, Metal oxide film
R11	441522724KF	2.7 kΩ, 1/2W, Metal oxide film
R20	41723334F	33kΩ, 2W, Metal oxide film
R21	441621634F	16kΩ, 1W, Metal oxide film
R26	5225072	N10HR4.7KBDM, Semi-fixed
R31, R32	441524714KF	470Ω, 1/2W, Metal oxide film
R33, R34	441524704KF	47Ω, 1/2W, Metal oxide film
R35, R37	441622734	27kΩ, 1W, Metal oxide film
R38	441621024	1kΩ, 1W, Metal oxide film
R41, R42	441621024F	1kΩ, 1W, Metal oxide film
R48, R49	441521214KF	120Ω, 1/2W, Metal oxide film
R60	441521514KF	150Ω, 1/2W, Metal oxide film
R61	441622724F	2.7kΩ, 1W, Metal oxide film
R63	441722204	22Ω, 2W, Metal oxide film
R65	441524704	47Ω, 1/2W, Metal oxide film
	Radiators	
	27160048A	
	Bus	
	27300157A	
	Plugs	
	25065070	NPLG-8P15
	25065055	NPLG-5P11
	Casies	
	27300342	A
	27300343	B
	Bracket	
	22012	RH-14

POWER AMPLIFIER PC BOARD (NAMP-984)

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	Transistors	
Q07	2211792 or	2SA992(F) or
	2211793	2SA992(E)
Q08	2211732 or	2SC1845(F) or
	2211733	2SC1845(E)
	Capacitors	
C01	3800003	0.1μF, 100V, DTG
C02, C04	379131047	0.1μF, 100V, DEW
C08	379221037	0.01μF, 50V, DEW
	Resistors	
R01 ~ R06	441520274	2.7Ω, 1/2W, Metal oxide film
R07 ~ R09	4000075	0.47Ω, 2W, Metal plate
R10 ~ R12	441720104	1Ω, 2W, Metal oxide film
R13 ~ R16	4000077 or	0.27Ω, 5W, Metal plate
	4000083	0.27Ω, 5W, Metal plate
R23 ~ R25	441523314	330Ω, 1/2W, Metal oxide film

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	Plugs	
	25065070	NPLG-8P15
	25065055	NPLG-5P11

PROTECTOR CIRCUIT PC BOARD (NAPC-985a)

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	Transistors	
Q501 ~ Q504	2211255	2SC1815(GR)
Q505	2211455	2SA1015(GR)
Q506	2211255	2SC1815(GR)
Q507	2211884 or	2SC2655(Y) or
	2211883	2SC2655(O)
	Diodes	
D501 ~ D504	223145	1S2076TD
D507	2239511 or	RD6.8E-B1 or
D508	223145	1S2076TD
	Coils	
L501, L502	231015	S-0.8c
	Capacitors	
C501, C502	379135635	0.056 μF, 100V, DEW
C503 ~ C506	352780109	1 μF, 50V, Elect.
C507, C508	352741019	100 μF, 16V, Elect.
C509	352742219	220 μF, 16V, Elect.
C510	352744719	470 μF, 16V, Elect.
C512 ~ C515	352780479	4.7μF, 50V, Elect.
C516, C517	379131027	1000pF, 100V, DEW
	Resistors	
R501, R502	441720474F	4.7Ω, 2W, Metal oxide film
R501, R502	441620244	2.4Ω, 1W, Metal oxide film [G]
R503~R508	441721504F	15Ω, 2W, Metal oxide film
R509, R510	441823314F	330Ω, 3W, Metal oxide film
R511, R512	441521014KF	100Ω, 1/2W, Metal oxide film
R513 ~ R516	441520334KF	3.3Ω, 1/2W, Metal oxide film
R523	441525614KF	560Ω, 1/2W, Metal oxide film
R524	441526804KF	68Ω, 1/2W, Metal oxide film
R534, R535	441620244	2.4Ω, 1W, Metal oxide film
	Relaies	
RL501	25065139	NRL-2P0, 3ADC12-05
RL502, RL503	25065140	NRL-2P5A-DC12-06
RL504, RL505	25065141	NRL-2P5A-DC12-07
	Plug	
	25065070	NPLG-8P15

PEAK METER DRIVE AMPLIFIER PC BOARD (NAME-2343)

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	ICs	
Q603	222529	TA7318P(R)
Q606, Q607	222502	NJM4558DX
	Transistors	
Q601, Q602	2211945	2SK246(GR), F.E.T.
Q604, Q605	2211255	2SC1815(GR)
Q608	2211792 or	2SA992(F) or
	2211793	2SA992(E)
Q609	2211732 or	2SC1845(F) or
	2211733	2SC1845(E)
Q610	2200394	2SC1625(Y)
Q611	2200404	2SA815(Y)
Q612	2211643 or	2SA965(O) or
	2211644	2SA965 (Y)
	Diodes	
D601, D602	223145T	1S2076TD
D603, D604	2239672	RD15E-B2
D605	223145	1S2076TD
D606, D607	4000068	VD1222
D608	2239672	RD15E-B2
D609, D610	2239771	RD24E-B1
D611	223145T	1S2076TD
D612, D613	223862	WL01
D614 ~ D629	223841	GP30G
D630, D631	223145T	1S2076TD
	Capacitors	
C601, C602	352784799P	0.47μF, 50V, Elect.
C605, C606	352780339P	3.3μF, 50V, Elect.
C607	352780109T	1μF, 50V, Elect.
C608, C609	379121035	0.01μF, 50V, DEW
C610, C611	352780339	3.3μF, 50V, Elect.
C612, C613	352754709	47μF, 25V, Elect.
C614, C615	352751019	100μF, 25V, Elect.
C618, C619	352751019	100μF, 25V, Elect.
C620	352753329	3,300μF, 25V, Elect.
C625, C626	379131047	0.1μF, 100V, DEW
C623 ~ C628	379121047	0.1μF, 50V, DEW
	Resistors	
R611, R612	5225067	N10HR470BDM, Semi-fixed
R639, R640	5225067	N10HR470BDM, Semi fixed
R644, R645	441521214KF	120Ω, 1/2W, Metal oxide film
R646, R647	441625614KF	560Ω, 1W, Metal oxide film
R648	441523904KF	39Ω, 1/2W, Metal oxide film
R649	441621824KF	1.8kΩ, 1W, Metal oxide film
R652 ~ R656	4000076	0.22Ω, 5W, Metal plate
	Relaies	
RL601	25065048	FRL-644-D1212AS
RL602	25065140	NRL-2P5A-DC12-06
	Plugs	
	25065055	NPLG-5P11
	25065068	NPLG-4P13
	Fuse holder	
	250113	SN5051
	25065096	NPF-073
	Radiators	
	27160029	RAD-07

METER ILLUMINATION LAMP PC BOARD (NAPL-987A)

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	Lamps	
PL801, PL802	210092	PL14V150mA
PL803, PL804	210089	PL14V150mA
	Resistors	
R801	441620124	1.2Ω, 1W, Metal oxide film
R802	441620434	4.3Ω, 1W, Metal oxide film
	Case	
	27250021	Lamp case
	Plugs	
	25055039	NPLG-3P30, Plug

METER ILLUMINATION LAMP PC BOARD (NAPL-987B)

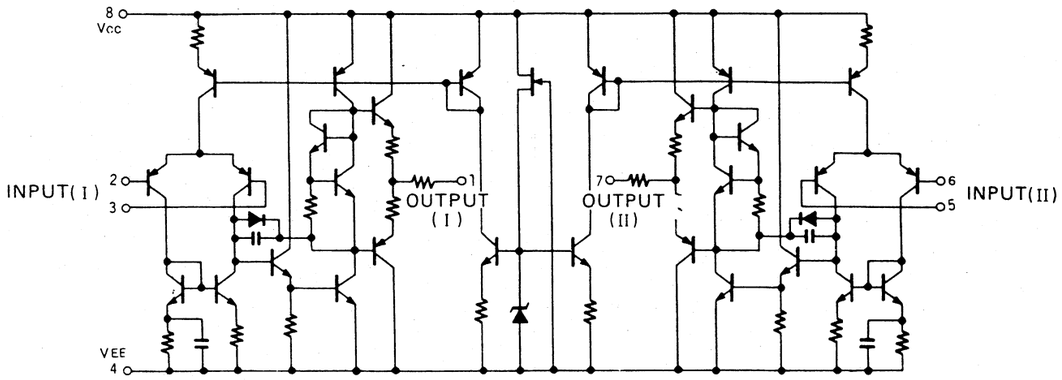
CIRCUIT NO.	PARTS NO.	DESCRIPTION
	Lamps	
PL901, PL902	210092	PL14V150mA
PL903, PL904	210089	PL14V150mA
	Resistors	
R901	441620124	1.2Ω, 1W, Metal oxide film
R902	441620434	4.3Ω, 1W, Metal oxide film
	Case	
	2725021	Lamp case
	Socket	
	2000151	NSAS-3P028 Socket

POWER INDICATOR PC BOARD (NAPL-1008)

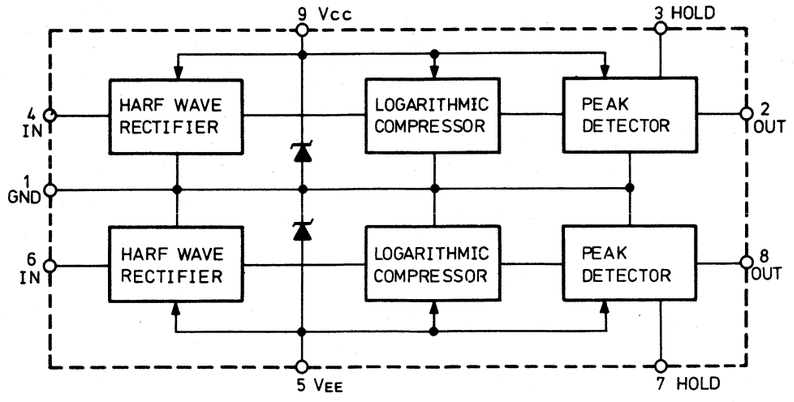
CIRCUIT NO.	PARTS NO.	DESCRIPTION
PL701	210092	PL14V 150mA, Lamp

IC BLOCK DIAGRAM

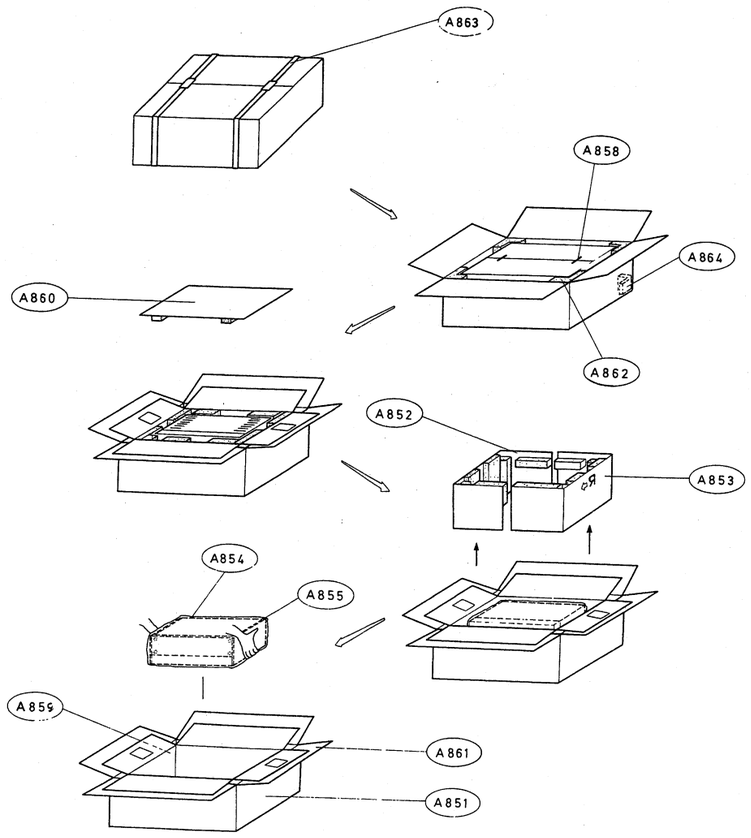
NJM4558DX



TA7318P



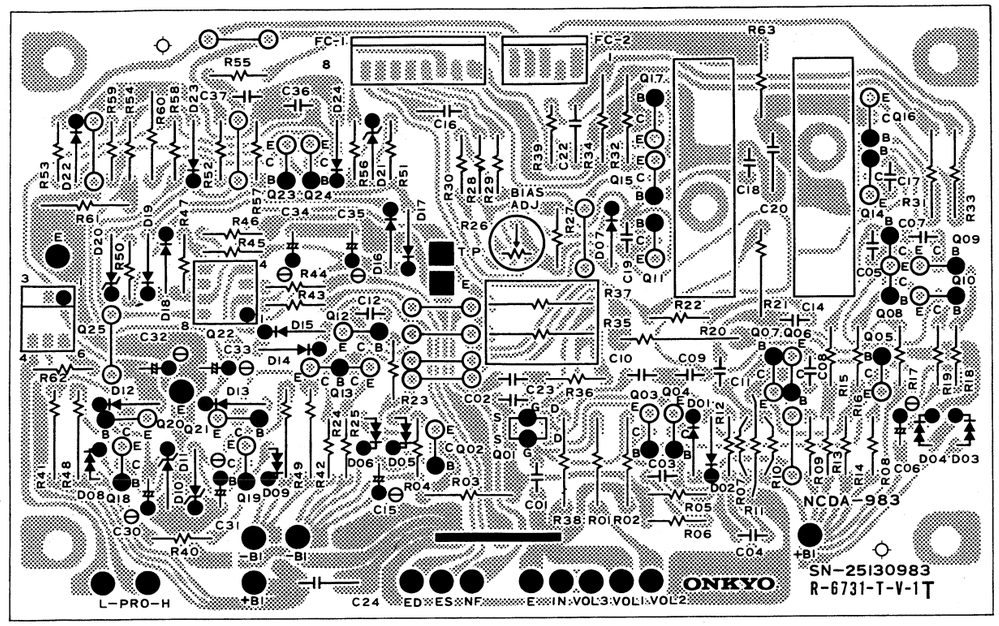
PACKING PROCEDURES



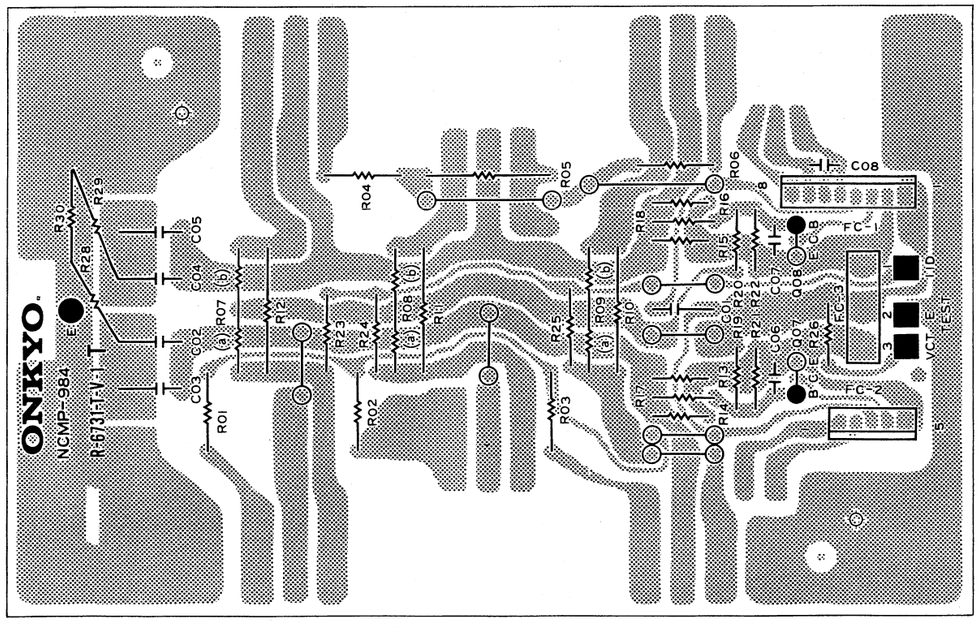
REF. NO.	PART NO.	DESCRIPTION
A851	29051127	Master carton box
A852	29091029	Pad, left
A853	29091030	Pad, right
A854	29095395	500 X 880mm, Protection sheet
A855	29100035A	720 X 1,020mm, Poly-vinyl bag
A858	282301	Sealing hook
A859	29090587	Pad, bottom
A860	29090588	Pad, top
A861	29051123	Master carton box G
A862	29090589	Pad
A863	29112010	Band
A864	29090429	Pad, corner
A880	Accessary bag ass'y	
	29340882	Instruction manual
	29365016	Warranty card
	2010069	Connection cable
	29100005	250 X 350mm, Poly-vinyl bag for accessary

PRINTED CIRCUIT BOARD VIEW FROM COMPONENT SIDE

NADA-983



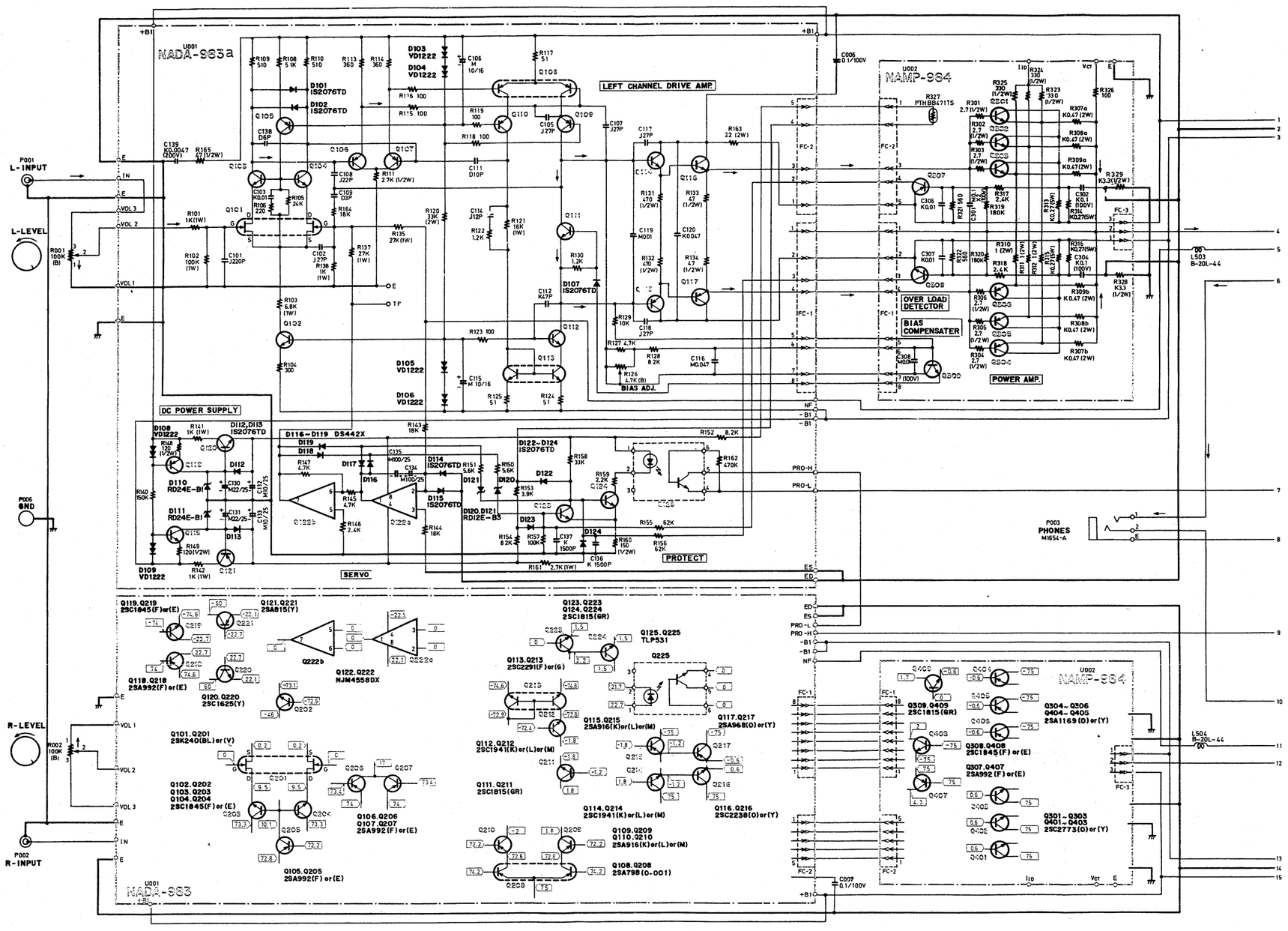
NAMP-984



1 2 3 4 5 6 7

A B C D E

SCHEMATIC DIAGRAM No. 1



RC-2015Q7 (1/2)

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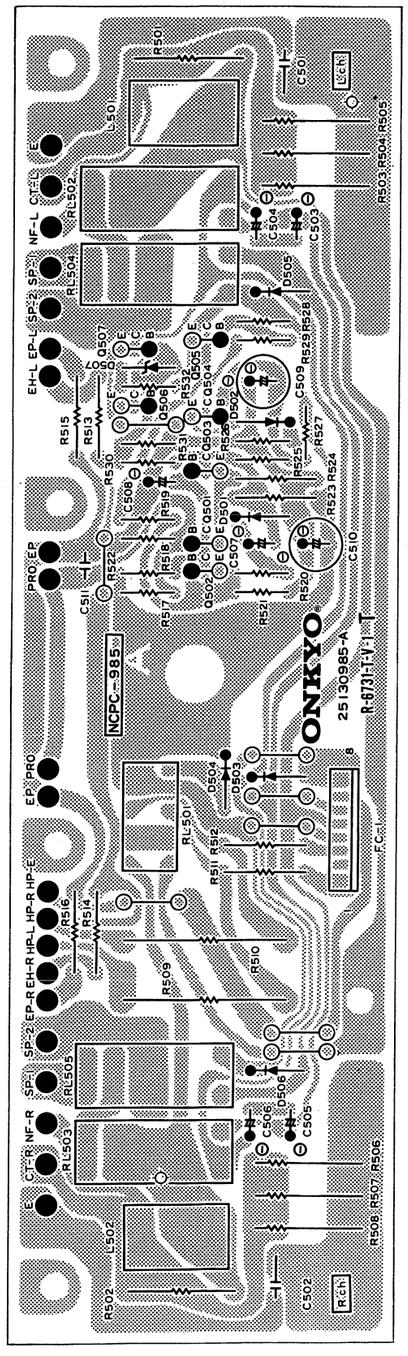
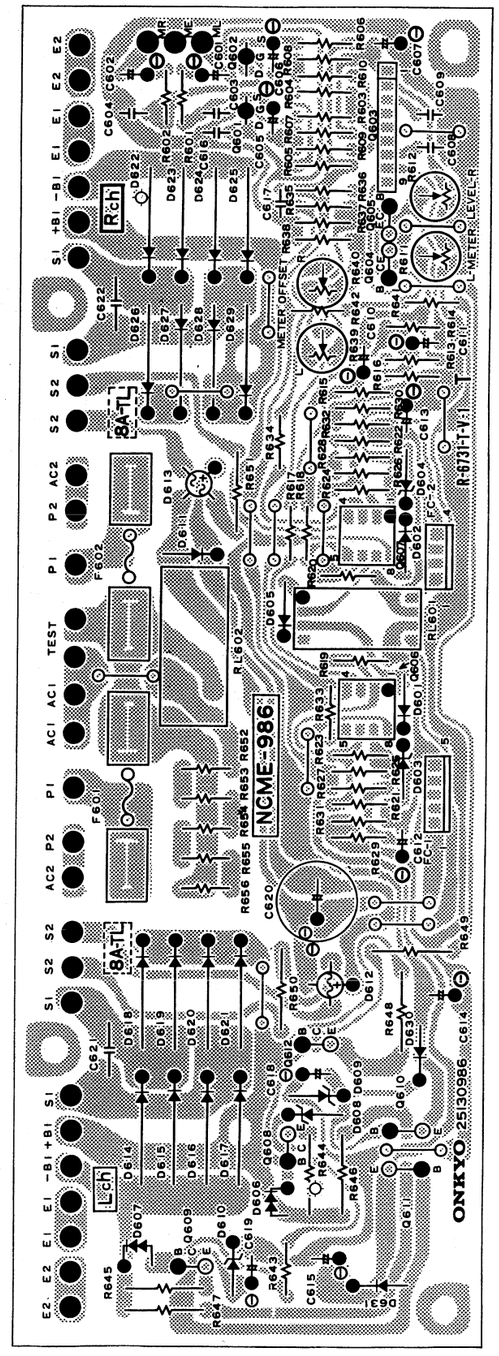
NAPC-985



NAME-986



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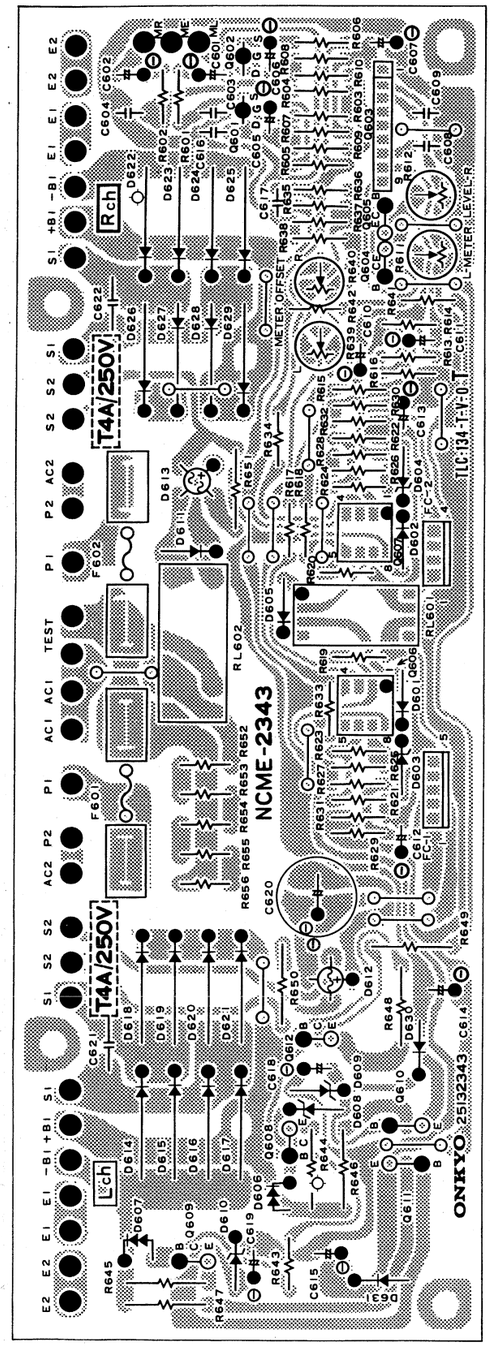
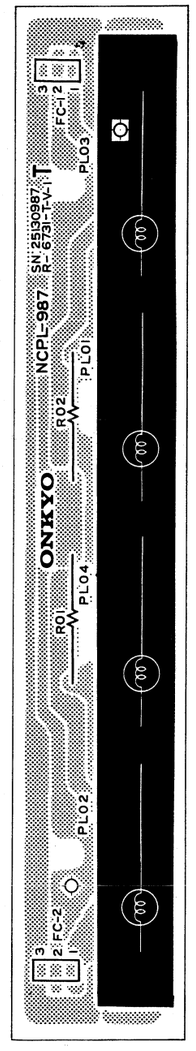
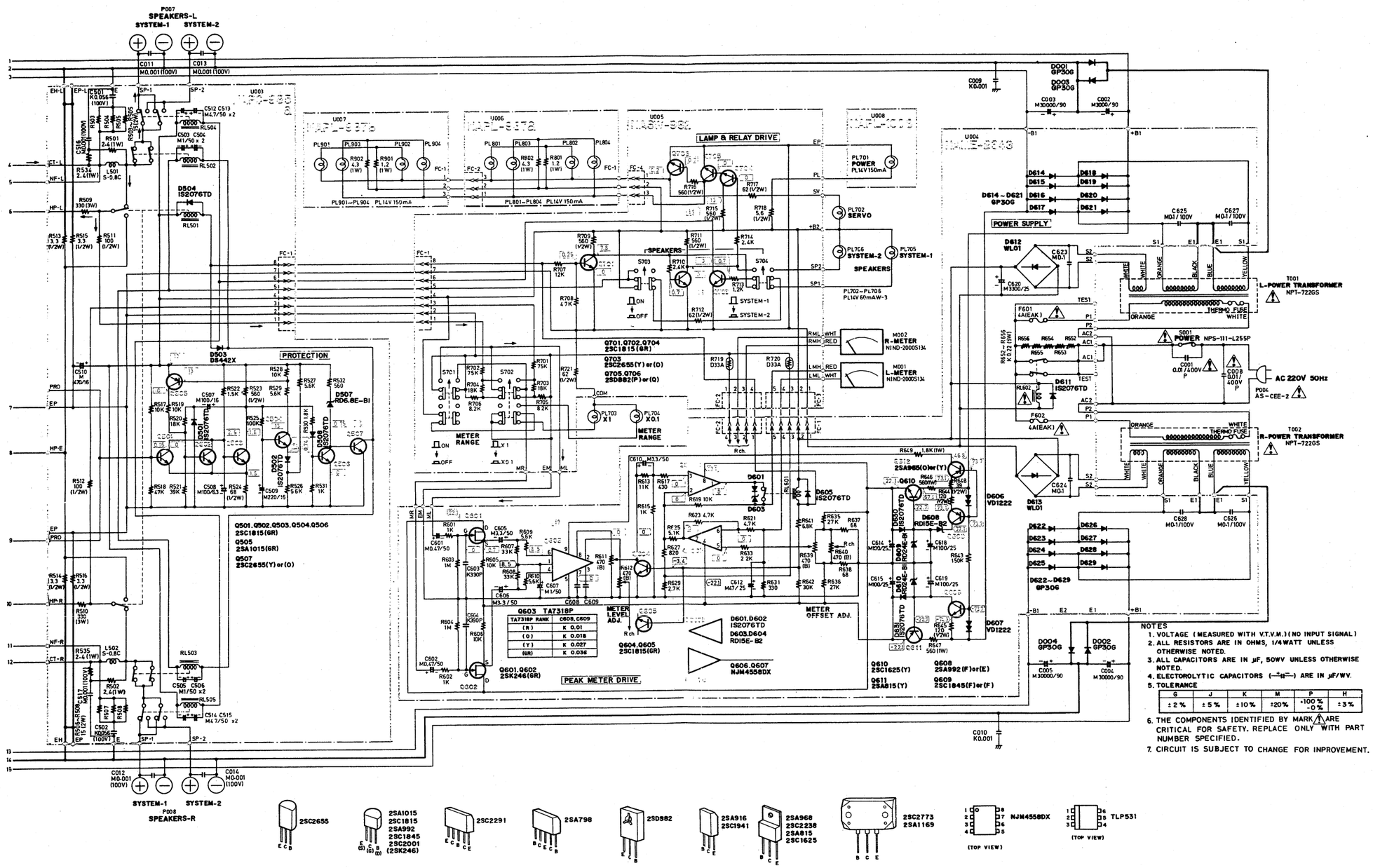


NAPL-987



SCHEMATIC DIAGRAM No. 2



NOTES

1. VOLTAGE (MEASURED WITH V.T.V.M.)(NO INPUT SIGNAL)
2. ALL RESISTORS ARE IN OHMS, 1/4WATT UNLESS OTHERWISE NOTED.
3. ALL CAPACITORS ARE IN μF, 50WV UNLESS OTHERWISE NOTED.
4. ELECTOROLYTIC CAPACITORS (—⊕—) ARE IN μF/WV.
5. TOLERANCE

G	J	K	M	P	H
± 2 %	± 5 %	± 10 %	± 20 %	+100 % −0 %	± 3 %

6. THE COMPONENTS IDENTIFIED BY MARK ⚠ ARE CRITICAL FOR SAFETY. REPLACE ONLY WITH PART NUMBER SPECIFIED.
7. CIRCUIT IS SUBJECT TO CHANGE FOR INPROVEMENT.

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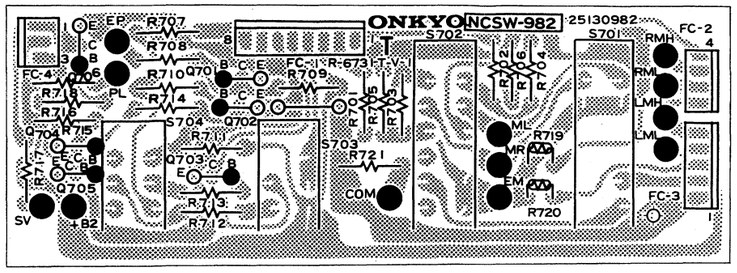
NASW-982



NAPL-1008